ORANGECODE: WEBSITE TO LEARN CODING VIA GAMING

NASRUL ARIF BIN ZAKRIA

BACHELOR OF COMPUTER SCIENCE (SOFTWARE ENGINEERING) WITH HONOURS

UNIVERSITI MALAYSIA PAHANG

Universiti Malaysia PAHANG

SUPERVISOR'S DECLARATION

I/We* hereby declare that I/We* have checked this thesis/project* and in my/our* opinion, this thesis/project* is adequate in terms of scope and quality for the award of the degree of *Doctor of Philosophy/ Master of Engineering/ Master of Science in .....

(Supervisor's Signature)

Full Name : DR. ABDULGABAR AHMED MOHAMMED AL SEWARI

Position : SENIOR LECTURER
FACULTY OF COMPUTING
SOFTWARE ENGINEERING
UNIVERSITI MALAYSIA PAHANG
LEBUHRAYA TUN RAZAK, 26300 GAMBANG,
KUANTAN, PAHANG
TEL: 09-549 2244 FAX: 09-549 2144

Date :

Universiti Malaysia PAHANG

STUDENT'S DECLARATION

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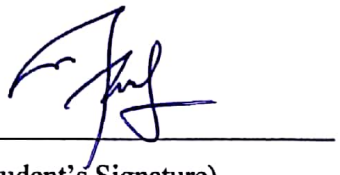

(Student's Signature)

Full Name : NASRUL ARIF BIN ZAKRIA

ID Number : CB15060

Date : 07/01/2019

GAMIFICATION AND VISUALIZATION OF C PROGRAMMING VIA E-LEARNING

NASRUL ARIF BIN ZAKRIA

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ABSTRAK

Belajar untuk mengaturcaraan adalah sangat sukar tanpa seseorang yang boleh menerangkan atau menggambarkannya. Terutamanya terhadap seseorang yang sememangnya tidak pernah tahu sebarang berkenaan pengaturcaraan. Hasil ujikaji mendapati terdapat terdapat sebahagian orang yang mengalami kesukaran mempelajari sesuatu tanpa mendapat gambaran visual berkenaannya. Jadi, projek ini akan menerangkan tentang pembinaan OrangeCode dan aplikasinya. OrangeCode merupakan sebuah platform atas talian berdasarkan laman sesawang untuk kegunaan bagi memahami asas-asas pengaturcaraan bermula daripada mempelajari pembolehubah-pembolehubah, penyataan bersyarat, gelungan dan banyak lagi. OrangeCode boleh digunakan sesiapa sahaja yang ingin mempelajari tentang pengaturcaraan daripada awal termasuklah kanak-kanak. Projek ini melibatkan kefahaman konsep pengaturcaraan tanpa menspeksifikasikan kepada mana-mana bahasa pengaturcaraan. Projek ini dibina dibawah dasar model proses perisian *Rapid Application Development* (RAD). OrangeCode menggunakan pendekatan gamifikasi serta visualisasi untuk menanam kefahaman konsep-konsep berkenaan kod kepada pelajar baharu. Pendekatan ini sangat bersesuaian dengan trend dunia sekarang dimana berlakunya reformasi permainan video dikalangan belia. Dengan kewujudan teknologi terbaru seperti komputer dan peranti mudah alih yang berkuasa tinggi, permainan video telah menjadi sebahagian daripada rutin kehidupan seharian seseorang terutamanya golongan belia. Golongan belia menghabiskan waktu hariannya dengan permainan video apabila mereka mempunyai waktu lapang. Oleh itu, strateginya adalah untuk menukarkan konsep pengetahuan kepada permainan video agar golongan belia dapat belajar sambil bermain permainan video tersebut. Atas hasil kepada projek ini, para pelajar kini lebih berminat untuk belajar dan memahami konsep pengaturcaraan.

ABSTRACT

Learning to code is definitely difficult without anyone explaining or visualizing it. Especially for a person who have never know any basic of coding. Studies show that there are certain person who can hardly learn something without the seeing the visual concept of it. Thus, this project will explain about the development of OrangeCode and their application. OrangeCode is a web-based online platform for the use of to understand the fundamental of coding starting from learning about variables, conditional statements, looping and more. OrangeCode can be used by any people who wanted to learn coding from the very beginning including kids. This project involves the knowledge of programming concept without referring to any specific programming language. This project was developed under the Rapid Application Development (RAD) software process model. It applied the approach of gamification and visualization to embed the concepts of coding among new learners. This approach is suitable with current world trends of video game reformation. With latest technology such as high performance computer and mobile devices, video games have become a part of lifestyle for a person especially the youths. Youths spend their day with video games whenever they have a free time. Therefore, the strategy is to convert knowledge concepts into video games so that the youths can learn while playing them. As a result from this project, students become even more interested to learn and understand programming concepts.

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LIST OF SYMBOLS

LIST OF ABBREVIATIONS

UMP	University Malaysia Pahang
AR	Augmented Reality
HTML	Hypertext Markup Language
CSS	Cascading Style Sheets
JS	JavaScript
RAD	Rapid Application Development
SDLC	Software Development Life Cycle
SRS	System Requirement Specification
MVC	Model View Controller

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Most educational institutes that offer courses related to computer or machine use C programming language as their fundamental syllabus for their enrolled students. The reasons are that most known programming languages such as Java, C#, C++ or even JavaScript and PHP have the similar syntax notation with C language in most general statements (Aki, Güllü, & Kaplanoğlu, 2015). Even in University Malaysia Pahang (UMP) itself, we have been using the language C in the subject Programming Technique for a very long time to consult students registered in the course regarding to the basic of programming. This involved the learning method of lecture session to define the concept of programming and lab session as the practical application of the understanding. However, because of the immense level of abstraction of concepts in programming, students and teachers found that programming is somehow compicated to understand (Sáez-López, Román-González, & Vázquez-Cano, 2016).

To these concerns, the project named 'OrangeCode: Website to Learn Coding via Gaming' will be implemented specifically for beginners who are still trying to tame themselves into programming in order to improve their understandings and eventually produce positive impacts upon their feedback. The usage of games for learning and Gamification has a major different in which Gamification intended to create a game like experience through integrating elements of games with real life contexts or environments while the use of games for learning is like designing the game which is totally intended for educational purposes (Souza, Veado, Moreira, Figueiredo, & Costa, 2018). Though, it is also exposed in latest research that visualizing both problem-solving and knowledge-construction processes is indispensable to understand complicated problem-solving contexts (Wang, Wu, Kinshuk, Chen, & Spector, 2013).

1.2 PROBLEM STATEMENTS

There are several groups of students who took *Programming Technique* subject in Universiti Malaysia Pahang (UMP) claim that they have to repeat the subject due to failures. This can affect their studies for example they might need to extend their studies especially when the subject becomes a prerequisite to another advance subjects.

Next is the unrelevant answers in programming tests and application shows that students fail to understand the programming concepts itself. Some academicians report that large amount of students were unable to answers properly. As we know, programming are mostly involves logical thinking and problem solving. This will affect the university's performance in term of the average scores and future employability of those students.

Finally, many students were unable to catch up with the programming concepts taught by their lecturers in class. Taking the possibilities of students who come from different background and very inexperienced in programming, this can contribute to the cause of why student become uninterested to learn programming, affecting their study progress and grade.

1.3 AIM AND OBJECTIVES

The aim of this project is to design and implement a new learning approach for *Programming Technique* subject. To achieve this aim, the following objectives should be done:

i. To investigate the implementation of the new approach in learning programming.
ii. To design and implement a new learning perspective that involved games and visualization.
iii. To evaluate the performance of the new approach in *Programming Technique* in several testing techniques.

1.4 SCOPES

i. Programming Syllabus

This project will cover general programming which is identifying variables and data types.

ii. Development Materials and Platforms

The development tools that will be used in this project are Unity3D with C# and will be integrated into a web site that can be accessed from any web browser from different platfoms. The web site will be published in a web server while being developed using PHP Laravel framework and MySQL database as the storage.

1.5 SIGNIFICANCE

i. Can increase the number of students that passed the subject *Programming Technique* in UMP.
ii. As an aid to academicians in teaching programming subject to students.
iii. Provide a new platform for students around the world that interested in programming but having hardship to understand the concept.

1.6 THESIS ORGANIZATION

The thesis consists of an abstract and three distinct chapters. The first chapter will discuss upon the background as well as the basic understanding of the project which includes the problem statements, objectives, scopes, significant and the thesis organization.

Chapter two will focused on the literature review for the project. It will extract any existing system or experiment related to this project in detail.

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